IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Appl. No.	:	09/828,550
Applicant	:	Michael W. Halpin
Filed	:	April 6, 2001
TC/A.U.	:	1763
Examiner	:	Rudy Zervigon
Title	:	BARRIER COATING FOR VITREOUS MATERIALS
Docket No.	:	ASMEX.271A
Customer No.	:	20,995

AMENDED APPEAL BRIEF

Mail Stop Appeal Brief – Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Dear Sir:

In response to the Notification of Non-Complaint Appeal Brief mailed on June 28, 2006, Applicant respectfully submits this Amended Appeal Brief in which the Appellant appeals the rejection of Claims 1-4, 6-10, 13, 14, 46-48 and 58-68 in the above-captioned patent application.

This Amended Appeal Brief is being filed in accordance with the rules of 37 C.F.R. § 41.37 and includes a Claims Appendix, an Evidence Appendix, and a Related Proceedings Appendix.

I. REAL PARTY IN INTEREST

The real party in interest is the assignee of record, ASM America, Inc.

II. RELATED APPEALS AND INTERFERENCES

The Appellant knows of no other appeals or interferences that will directly affect, be directly affected by, or have a bearing on the Board's decision in this Appeal.

III. STATUS OF CLAIMS

Claims 1-4, 6-10, 13, 14, 46-48 and 58-68 are pending.

Claims 5, 11, 12, 15-45 and 49-57 have been cancelled.

Claims 1-4, 6-10, 13, 14, 46-48 and 58-68 stand rejected under 35 U.S.C. §103(c) upon the ground set forth in the Final Office Action mailed May 9, 2005.

Claims 59, 60 and 62-28 stand rejected under 37 C.F.R. 1.75(c) as being of improper dependent form.

In an Amendment after Final filed herewith, Claims 59, 60 and 64-68 have been amended to correct the informality noted above with respect to Claims 59, 60 and 62-28. This amendment has not been entered yet.

Claims 1-4, 6-10, 13, 14, 46-48 and 58-68 are the subject of this appeal.

A copy of Claims 1-4, 6-10, 13, 14, 46-48 and 58-68 involved in the appeal and in light of the Amendment after Final filed herewith can be found in Appendix A.

IV. STATUS OF AMENDMENTS

As disclosed in Section III, in an Amendment after Final filed herewith, Claims 59, 60 and 64-68 have been amended to correct the informality noted above with respect to Claims 59, 60 and 62-28. All other previous amendments to the claims have been entered.

V. SUMMARY OF CLAIMED SUBJECT MATTER

A. Independent Claim 1

As recited in the Claim Appendix, Claim 1 reads as follows:

> A semiconductor processing apparatus comprising a reaction chamber and one or more vitreous components that have a support surface for supporting other components in the reaction chamber, said support surface being covered at least in part by a devitrification barrier coating that is bonded to said support surface and directly contacts said supported other components in the reaction chamber; where said devitrification barrier coating has a thickness between about 1 and 10,000 angstroms.

With reference to Figures 1-2, independent Claim 1 recites a semiconductor processing apparatus comprising a reaction chamber 10 that includes a support surface 24 for supporting other components in the reaction chamber 10. *See* page 10, lines 1–5. The support surface is covered, at least in part, by a devitrification barrier coating 40 that is bonded to the support surface and directly contacts the supported other components in the reaction chamber. *See* page 10, lines 4–6. The devitrification barrier coating 40 has a thickness between about 1 and 10,000 angstroms *See* page 9, line 3.

B. Independent Claim 58

As recited in the Claim Appendix, Claim 58 reads as follows:

> A semiconductor processing apparatus comprising a reaction chamber and a thermocouple, the thermocouple comprising a quartz sheath having an outer surface that is covered at least in part by a devitrification barrier coating having a thickness between about 1 and 10,000 angstroms.

With initial reference to Figures 1-2, independent Claim 58 recites a semiconductor processing apparatus comprising a reaction chamber 10 and a thermocouple 34. *See* page 8, lines 3–4. With reference to Figure 3, the thermocouple 34 comprising a quartz sheath 35. *See* page 8, lines 7-8 and 16-18. The quartz sheath 35 has an outer surface that is covered at least in part by a devitrification barrier

coating 40. *See* page 8, lines 22-24. The coating 40 has a thickness between about 1 and 10,000 angstroms. *See* page 9, line 3.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

1. Claims 1-4, 6-9, 13, 14, 46-48, and 58-68 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,342,691 to Johnsgard et al. ("the Johnsgard patent") in view of U.S. Patent No. 6,120,640 to Shih et al. ("the Shih patent") and U.S. Patent No. 5,065,698 to Atushi Koike ("the Koike patent").

2. Claims 1-4, 6-9, 10, 13, 14 and 46-48 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,325,858 to Wengert ("the Wengert patent") in view of the Shih patent and the Koike patent.

VII. ARGUMENT

A. Rejection of Claims 1-4, 6-9, 13, 14, 46-48, and 58-68 under 35 U.S.C. § 103(a) over the Johnsgard patent in view of the Shih patent and the Koike patent.

Claims 1-4, 6-9, 13, 14, 46-48, and 58-68

As discussed in Section V, both independent Claim recite, in part, a "semiconductor processing apparatus comprising ... a devitrification barrier coating having a thickness between about 1 and 10,000 angstroms." In Claim 1, the devitrification barrier is bonded to a support surface that directly contacts supported other components. In Claim 58, the devitrification barrier covers an outer surface of a quartz sheath of a thermocouple.

The Examiner has acknowledged that neither the Johnsgard patent nor the Shih patent teach a devitrification barrier coating having a thickness of about 1 to 10,000 angstroms as recited in the claims. *See e.g.,* the Office Action dated February 17, 2004, page 8, paragraph 9. Before reopening prosecution, the Examiner had argued that it would be obvious to those of ordinary skill in the art to optimize the thickness of a silicon nitride devitrification barrier such that it would lie within the claimed ranged. *See e.g.,* the Office Action dated August 31, 2004, page 8. In an Appeal Brief filed on March 3, 2005, Applicant argued that there is no teaching or suggestion in the cited art to use silicon nitride as a devitrification barrier and, when silicon nitride is employed for other purposes, other thickness ranges are used. Moreover, before an optimum range can be characterized as a result of routine experimentation, a particular parameter must first be recognized as a result-effective variable, i.e., a variable which achieves the recognized result. *See* MPEP § 2144.05. In this case, the cited art does not recognize the use of silicon nitride as a devitrification barrier coating on a support surface (independent Claim 1) or on a thermocouple (independent Claim 58). As such, there is no recognition in the cited art of the "recognized result" needed for one of ordinary skill in the art to optimize the thickness of a devitrification barrier coating as suggested by the Examiner.

In response to Applicant's Appeal Brief, the Examiner reopened prosecution and provided a new ground of rejection in which the Examiner added the Koike patent to the previously used combination of the Johnsgard patent and the Shih patent. However, as explained below, there is no motivation to combine the Koike patent with the Johnsgard and Shih patents.

The primary reference (the Johnsgard patent) does not disclose a devitrification barrier. Instead, the Johnsgard patent discloses using silicon nitride as a reflective layer on an insulating reactor wall. *See* Col. 17, lines 22-30. Specifically, the Johnsgard patent states that one alternative to glazed opaque quartz is to use insulating walls "formed from a transmissive material such as clear quartz [that have been] coated with a reflective material such as alumina, silicon carbide or silicon nitride." *Id.* However, no thickness is disclosed for this silicon nitride reflective layer. The Johnsgard patent therefore does not teach or suggest the recited thickness and it does not provide any teaching or suggestion for using a silicon nitride coating as a devitrification barrier.

In a similar manner, the Shih patent discloses an erosion resistant barrier of silicon nitride as an alternative to B_4C. However, no thickness is disclosed for this silicon nitride barrier and the disclosed thickness of the B_4C barrier (approximately 1,250,000 angstrom) is significantly larger than the claimed range of 1 to 10,000 angstroms. *See* Col. 9, lines 19-25 and Col. 10, lines 50-65. In addition, the erosion resistant barrier is for walls made of aluminum, aluminum based materials, stainless steels and other steels. *See* Col. 11, 45-55. The thickness of the barrier is determined by the erosion rates in the reactor. *See* Col. 5, lines 30-34. Accordingly, the Shih patent would merely suggest to one of skill in the art a relatively thick erosion barrier over metallic walls. As taught by the Shih patent, the thickness of this coating would be determined by the erosion rates of the reactor. Importantly, there is no teaching or suggestion to use a silicon nitride coating as a devitrification barrier nor is there any teaching of a protective layer in the recited thickness range.

To address the deficiencies in the Johnsgard and Shih patents, the Examiner uses the Koike patent and stated that it would have been obvious to modify the silicon nitride barrier of the Shih patent to achieve the claimed thickness. The motivation for

this combination according to the Examiner is that Koike "is drawn to an alternate and equivalent means for coating Johnsgard's silicon nitride devitrification barrier." *See* page 4 of the Office Action dated May 9, 2005.

However, the Koike patent merely discloses depositing a silicon nitride film of 800 angstroms on a substrate. *See* Col. 10, lines 25-26. Subsequent films are then deposited on this silicon nitride film to form a substrate with desired properties. *See* e.g., Col. 10, lines 45-50. Thus, failing to show (i) a motivation to use a silicon nitride coating as a devitrification barrier and (ii) a protective layer in the recited thickness range, the Examiner merely picked a reference with a silicon nitride film within the recited range. However, the Examiner has still not provided any motivation to form a silicon carbide coating for use as a devitrification barrier within the recited range. Indeed, how can the Examiner state that Koike is "drawn to an alternate and equivalent means for coating" when the Johnsgard patent does not disclose a thickness. That is, how does the Examiner know that 800 angstoms is a suitable thickness for the reflective layer of the Johnsgard patent.

In summary, there is no motivation in the cited art to optimize the thickness of a silicon carbide coating for use as a devitrification barrier. Instead, the Shih patent discloses an erosion barrier of unspecified thickness and the Johnsgard patent discloses a reflective layer of unspecified thickness. The Koike patent merely discloses a silicone nitride film on a substrate that lies within the recited range. However, there is no motivation to combine the references as suggested by the Examiner.

B. Rejection of Claims 1-4, 6-9, 13, 14, and 46-48 under 35 U.S.C. § 103(a) over the Wengert patent in view of the Shih patent and the Koike patent.

Claims 1-4, 6-9, 13, 14, 46-48, and 58-68

As discussed in Section V, both independent Claim recite, in part, a "semiconductor processing apparatus comprising ... a devitrification barrier coating having a thickness between about 1 and 10,000 angstroms." In Claim 1, the devitrification barrier is bonded to a support surface that directly contacts supported

other components. In Claim 58, the devitrification barrier covers an outer surface of a quartz sheath of a thermocouple.

The Examiner has acknowledged that neither the Wengert patent nor the Shih patent, teaches a semiconductor apparatus with having a devitrification barrier coating with a thickness between about 1 and 10,000 angstroms as recited in independent Claims 1 and 58. *See e.g.,* page 7 of the Final Office Action dated May 9, 2005. Nevertheless, the Examiner has argued that it would be obvious to combine the substrate film 800 angstroms of the Koike patent with the Wengert and Shih patents. Applicant disagrees.

With respect to the Wengert patent, this reference discloses coating a non-vitreous material (e.g., graphite) with silicon carbide. *See* Col. 1, lines 30-35. The Wengert also discloses a separate component or sheath (considerably thicker than the recited coating) that fits over a corresponding quartz component. *See* Col. 7, lines 5-10. Therefore, the Wengert patent also does not provide any teaching or suggestion for using a silicon nitride coating as a devitrification barrier, and therefore does not teach or suggest the recited thickness.

The Shih patent has been discussed above and does not cure the deficiency in the Wengert patent. In addition, as mentioned above, the Koike patent merely discloses depositing a silicon nitride film of 800 angstroms on a substrate. Subsequent films are then deposited on this silicon nitride film to form a substrate with a desired properties. There is no suggestion or teaching that a silicon nitride film of such thickness would be useful coating as a devitrification barrier. Thus, there is no motivation to combine the references as suggested by the Examiner.

C. Conclusion

In view of the foregoing arguments distinguishing Claims 1-4, 6-9, 13, 14, 46-48, and 58-68 over the art of record, Appellant respectfully requests that the rejection of these claims be reversed.

Please charge any additional fees, including any fees for additional extensions of time, or credit overpayment to Deposit Account No. 11-1410.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: 7-28-06

By: _____

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CLAIMS APPENDIX

1. (**Previously presented**) A semiconductor processing apparatus comprising a reaction chamber and one or more vitreous components that have a support surface for supporting other components in the reaction chamber, said support surface being covered at least in part by a devitrification barrier coating that is bonded to said support surface and directly contacts said supported other components in the reaction chamber; where said devitrification barrier coating has a thickness between about 1 and 10,000 angstroms.

2. (**Original**) The apparatus of Claim 1, wherein said one or more vitreous components are formed from quartz.

3. (**Original**) The apparatus of Claim 1, wherein said devitrification barrier comprises silicon nitride.

4. (**Original**) The apparatus of Claim 1, wherein said devitrification barrier coating is formed from silicon nitride that has been deposited on said one or more vitreous components using CVD deposition.

5. (**Canceled**)

6. (**Previously presented**) The apparatus of Claim 1, where said devitrification barrier coating has a thickness between about 50 and 5000 angstroms.

7. (**Previously presented**) The apparatus of Claim 6, where said devitrification barrier coating has a thickness between about 500 and 3,000 angstroms.

8. (**Previously presented**) The apparatus of Claim 7, where said devitrification barrier coating has a thickness of about 800 angstroms.

9. (**Previously presented**) The apparatus of Claim 1, where said devitrification barrier coating is selected from the group consisting of silicon nitride, diamond, titanium nitride, titanium carbon nitride, and combinations thereof.

10. (**Previously presented**) The apparatus of Claim 1, wherein said devitrification barrier coating covers an entire portion of said support surface of said one or more vitreous components.

11. (**Canceled**)

12. (**Canceled**)

13. (**Previously presented**) The apparatus of Claim 1, wherein said apparatus further comprises a support device comprising at least one laterally extending member, said radially extending member including an upwardly extending projection that defines said support surface, said projection and support device configured to support a substrate within said apparatus, said support surface of said projection being covered at least in part by said devitrification barrier coating.

14. (**Original**) The apparatus of Claim 1, wherein said reaction chamber is a chemical vapor deposition reaction chamber.

15-45. (**Canceled**)

46 (**Previously presented**) The apparatus as in Claim 1, wherein said devitrification barrier coating is formed from silicon nitride that has been deposited on said one or more vitreous components using sputtering.

47. (**Previously presented**) The apparatus of Claim 1, wherein said devitrification barrier coating is formed by CVD.

48. (**Previously presented**) The apparatus of Claim 1, wherein said devitrification barrier coating is formed by sputtering.

49-57. (**Canceled**)

58. (**Previously presented**) A semiconductor processing apparatus comprising a reaction chamber and a thermocouple, the thermocouple comprising a quartz sheath having an outer surface that is covered at least in part by a devitrification barrier coating having a thickness between about 1 and 10,000 angstroms.

59. (**Not entered**) The apparatus of Claim 58, wherein said devitrification barrier comprises silicon nitride.

60. (**Not entered**) The apparatus of Claim 58, wherein said devitrification barrier coating is formed from silicon nitride that has been deposited on said thermocouple using CVD deposition.

61. (**Previously presented**) The apparatus of Claim 58, where said devitrification barrier coating has a thickness between about 50 and 5,000 angstroms.

62. (**Previously presented**) The apparatus of Claim 59, where said devitrification barrier coating has a thickness between about 500 and 3,000 angstroms.

63. (**Previously presented**) The apparatus of Claim 60, where said devitrification barrier coating has a thickness of about 800 angstroms.

64. (**Not entered**) The apparatus of Claim 58, where said devitrification barrier coating is selected from the group consisting of silicon nitride, diamond, titanium nitride, titanium carbon nitride, and combinations thereof.

65. (**Not entered**) The apparatus of Claim 58, wherein said devitrification barrier coating only covers a portion of said quartz sheath that is most susceptible to devitrification.

66. (**Not entered**) The apparatus as in Claim 58, wherein said devitrification barrier coating is formed from silicon nitride that has been deposited on said thermocouple using sputtering.

67. (**Not entered**) The apparatus of Claim 58, wherein said devitrification barrier coating is formed by CVD.

68. (**Not entered**) The apparatus of Claim 58, wherein said devitrification barrier coating is formed by sputtering.

EVIDENCE APPENDIX

[NONE]

RELATED PROCEEDINGS APPENDIX

[NONE]

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